PCAN-TJA1054

Bus Converter High-Speed CAN to Low-Speed CAN

User Manual v2.0.0

PEAK System

Products taken into account

Product Name	Model	Part number
PCAN-TJA1054		IPEH-002039

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Contents

1 Introduction 4
1.1 Properties at a Glance 4
1.2 System Requirements 5
1.3 Scope of Supply 5

2 Connectors 6
2.1 Connecting the High-speed CAN Side 6
2.2 Connecting the Low-speed CAN Side 7

3 Operation 8
3.1 Bit Rate 8
3.2 Low Power Modes 8
3.3 Status LED 9
3.4 Red Error LED 9

4 Technical Specifications PCAN-TJA1054 10

Appendix A CE-Certificate 12

Appendix B Dimension Drawing 13

Appendix C Quick Reference 14

1 Introduction

Tip: At the end of this manual (Appendix C) you can find a Quick Reference with brief information about the operation of the PCAN-TJA1054.

The PCAN-TJA1054 bus converter establishes a connection between a High-speed CAN bus (ISO 11898-2) and a Low-speed CAN bus (ISO 11898-3). One of the most important potential applications of the bus converter is a simple connection between a PEAK CAN interface (e.g. PCAN-USB) and a Low-speed CAN bus.

Low-speed CAN (LS-CAN)

The LS-CAN is primarily intended for low-speed applications up to 125 kbit/s in passenger cars. Like the High-speed CAN (HS-CAN) the LS-CAN transmits signals differentially through two wires. However, its fault tolerance (e.g. at a short circuit) automatically provides an operation with only a single wire.

1.1 Properties at a Glance

- Adapter from High-speed CAN to Low-speed CAN
- Bit rates of up to 125 kbit/s
- CAN transceiver NXP PCA82C251 and TJA1054
- Termination resistors for Low-speed CAN can be switched (560 Ohm / 5.66 kOhm)
- Power LED
- Error LED (Low-speed CAN)
- CAN bus connection via D-Sub, 9-pin (in accordance with CiA® 102)

- Power supply (5 V) through pin 1 of the High-speed CAN connection. All PEAK CAN interfaces can be set to the required supply via solder jumper
- Extended operating temperature range from -40 to 85 °C (-40 to 185 °F)

Note: You can find additional information about the properties and the behavior of the LS-CAN transceiver TJA1054 in the corresponding data sheet, which you can download, e.g. from the NXP website: www.nxp.com

1.2 System Requirements

- HS-CAN component capable of routing a 5-Volt supply to the CAN connector (can be set for all CAN interfaces from the PCAN series)

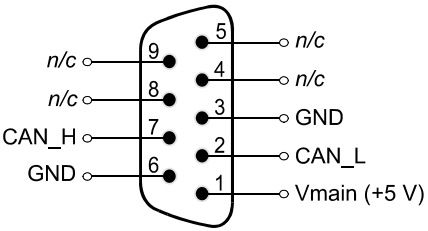
1.3 Scope of Supply

- Adapter in plastic casing
- Manual in PDF format

2 Connectors

2.1 Connecting the High-speed CAN Side

The PCAN-TJA1054 is designed for a direct connection to a HS-CAN component (e.g. PCAN-USB). The HS-CAN side has a 9-pin D-Sub connector. The pin assignment corresponds to the specification CiA® 102.



n/c = not connected

Figure 1: Pin assignment HS-CAN

Attention! Make sure, that the HS-CAN component always is turned off when connecting or disconnecting the PCAN-TJA1054. Otherwise the PCAN-TJA1054 or the connected hardware may be damaged or destroyed.

Between CAN_L and CAN_H a terminating resistor of 60 Ω is installed internally. Therefore an additional line termination is not needed for the connected HS-CAN component.

For power supply the PCAN-TJA1054 uses a direct voltage of +5 V (V_{main}). This must be applied to pin 1 of the HS-CAN connector.

Note: Please see the documentation of the HS-CAN component the PCAN-TJA1054 shall be connected to, to obtain information about a power supply on pin 1.

2.2 Connecting the Low-speed CAN Side

For the connection of the LS-CAN bus a 9-pin D-Sub port is used. The assignment is as follows:

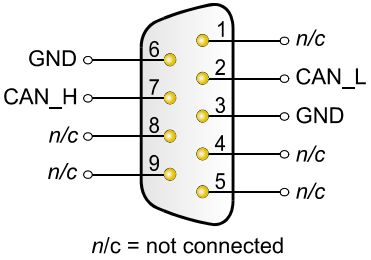


Figure 2: Pin assignment LS-CAN

Bus termination Low-speed CAN

Every node in a Low-speed CAN has a terminating resistor. For optimum system conditions the whole CAN bus should be terminated with 100 Ω (parallel connection of all terminating resistors). A single node should be terminated with at least 500 Ω and at most 6 kΩ.

To simplify the adaptation of the PCAN-TJA1054 to an existing CAN bus you can switch between the terminating resistors 560 Ω and 5.66 kΩ using the slide switch.

For smaller CAN busses or for testing a single component the slide switch should be set to 560 Ω. For monitoring or configuration of existing CAN busses, that are already optimized regarding termination, the slide switch should be set to 5,66 kΩ to minimize an influence on the total termination.

3 Operation

3.1 Bit Rate

Make sure that the bit rate of the connected HS-CAN component matches the bit rate of the LS-CAN bus for operating the PCAN-TJA1054. No conversion or automatic adaptation of the bit rate is done in the PCAN-TJA1054.

3.2 Low Power Modes

Note: The LS-CAN transceiver always works with the normal operation mode. The operation in one of the low-power modes "Sleep" or "Standby" is not possible.

Because the PCAN-TJA1054 is connected to further hardware (controllers, for example) only through the CAN bus, it is not capable of activating one of the low-power modes.

If the PCAN-TJA1054 shall be connected to the LS-CAN bus of a motor vehicle, that uses a low-power mode, the following should be considered:

In a low-power mode all transceivers in a motor vehicle terminate CAN_L against the battery. However, the PCAN-TJA1054 still terminates CAN_L against V_{CC}. On CAN_L the voltage adjusts to a level above or below the recognition threshold for short circuits on CAN_L (7.3 V) depending on the network size and termination.

If the voltage on CAN_L stays below 7.3 V, a shunt current leads to an increased current consumption in the motor vehicle.

If however the voltage on CAN_L is above 7.3 V, the PCAN-TJA1054 detects a short circuit on CAN_L and switches to single wire operation (CAN_H). The communication is ensured but an error is indicated by the red LED (see section *3.4 Red Error LED*).

3.3 Status LED

LED	Meaning
Green	Power, Voltage supply +5 V
Red	Error, Error condition on the LS-CAN bus

3.4 Red Error LED

The red LED indicates the state of the error output of the LS-CAN transceiver. This output is active for the following error conditions on the Low-speed CAN side:

- Interrupt on CAN_H
- Interrupt on CAN_L
- Short circuit between CAN_H and GND
- Short circuit between CAN_H and VCC
- Short circuit between CAN_L and GND
- Short circuit between CAN_L and VCC
- Short circuit between CAN_H and CAN_L

Please see the data sheet for the CAN transceiver TJA1054 for further details.

4 Technical Specifications PCAN-TJA1054

CAN	
High-speed CAN	ISO 11898-2 2.0A (standard format) and 2.0B (extended format Transceiver: PCA82C251 D-Sub socket, 9 pins (in accordance with CiA® 102) Internal bus termination with 62 Ω (fixed)
Low-speed CAN	ISO 11898-3 Transceiver: TJA1054 D-Sub plug, 9 pins Internal bus termination with 560 Ω or 5.66 kΩ (switchable)
Bit rate	max. 125 kbit/s

Power supply	
Supply Voltage	+5 V = (via pin 1 of D-Sub socket)
Power consumption	Normal operation: 20 – 30 mA At an Error: 40 mA Maximum: 80 mA (peak)

Environment	
Operating temperature	-40 - +85 °C (-40 to 185 °F)
Temperature for storage and transport	-40 - +100 °C (-40 to 212 °F)
Relative humidity	15 - 90 %, not condensing
EMC	EN 55024: 2003-10 EN 55022: 2008-05 EC directive 2004/108/EG
Ingress protection (IEC 60529)	IP20

Measures	
Size	50 x 32 x 17 mm See also dimension drawing Appendix B on page 13
Weight	25 g

Appendix A CE-Certificate

PCAN-TJA1054 IPEH-002039 – EC Declaration of Conformity
PEAK-System Technik GmbH

Notes on the CE Symbol CE

The following applies to the PCAN-TJA1054 products
IPEH-002039

EC Directive

This product fulfills the requirements of EC directive 2004/108/EG on "Electromagnetic Compatibility" and is designed for the following fields of application as per the CE marking:

Electromagnetic Immunity
DIN EN 55024, Publication date: 2003-10
Information technology equipment, immunity characteristics – Limits and methods of measurement (IEC/CISPR 24:1997, modified + A1:2001 + A2:2003);
German version EN 55024:1998 + A1:2001 + A2:2003

Electromagnetic Emission
DIN EN 55022, Publication date: 2008-05
Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement (IEC/CISPR 22:2005, modified + A1:2005);
German version EN 55022:2006 + A1:2007

Declarations of Conformity

In accordance with the above mentioned EU directives, the EC declarations of conformity and the associated documentation are held at the disposal of the competent authorities at the address below:

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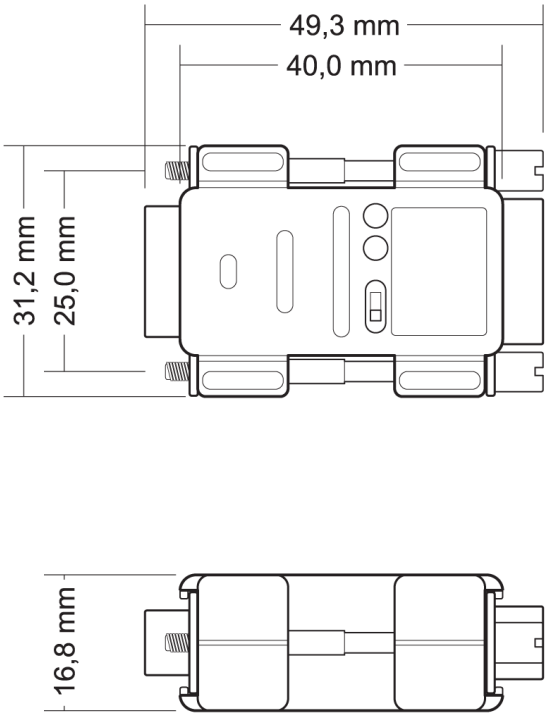
Signed this 4th day of October 2011

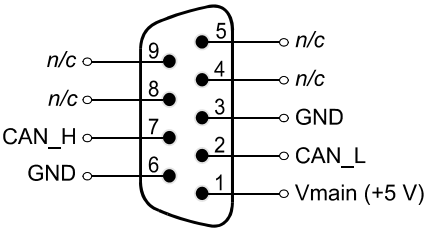
Appendix B Dimension Drawing



The figure doesn't show the actual size of the product.

Appendix C Quick Reference

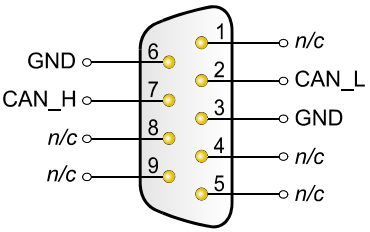
High-speed CAN socket



n/c = not connected

Connect or disconnect the PCAN-TJA1054 only, when the relevant HS-CAN component is turned off!

Low-speed CAN plug



n/c = not connected

Slide switch Low-speed CAN termination

- 560 Ω for building smaller networks, testing single components
- 5.66 kΩ for monitoring or configuring existing networks (already terminated optimally)

Status LEDs

LED	Meaning
Green	Power, Voltage Supply +5 V
Red	Error, Error condition on the LS-CAN bus

Bit rate

Is configured in the connected HS-CAN component. Make sure that the bit rate of the connected HS-CAN component matches the bit rate of the LS-CAN bus for operating the PCAN-TJA1054.